Facilitating the transition to a flexible, low carbon energy system

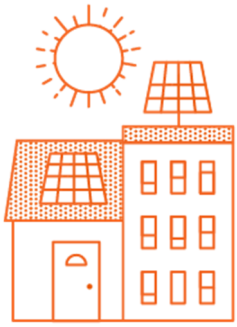
The ESO RIIO-2 Business Plan 2021-23 Executive Summary

October 2019

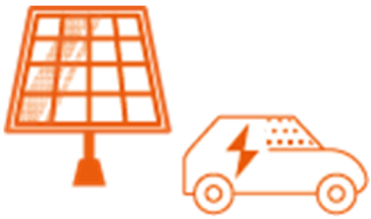
nationalgridESO

Facilitating the transition to a net zero energy system

May 2019: Britain had its first fortnight without using electricity from coal since the 1880s.**1000 coal free hours in total this year.**

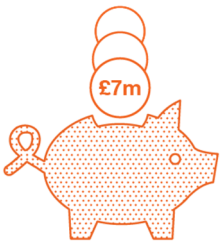


New peak solar generation record. **9.55 GW power generated from solar.**



Embedded generation: **in 2012 the industry predicted 12% in 2020, levels hit 27% in 2017.**

60% increase in active Balancing Mechanism Units in the system and a **42% increase in balancing service providers.**



£7 million annual efficiency savings in RIIO-2.

2025 when we will be able to operate a carbon free electricity system.

£250 million annual cost of the ESO.

Consumer bills £3 lower.

£2 billion net consumer benefits to be delivered in RIIO-2.

1. Executive Summary

1.1 The ESO at the heart of the energy system transition

Energy is the lifeblood of our economy and society. As the Electricity System Operator (ESO) for Great Britain, we hold a unique position at the heart of the nation's energy system. Our actions influence investment decisions and markets worth billions of pounds. Our role is critical for the transformation of the energy system.

Supported by a new, bespoke regulatory model, we will facilitate the transition to a zero carbon power system, helping to achieve the UK's recent commitment to net zero emissions by 2050.

The energy landscape is undergoing a revolution – and change will continue at an even greater pace. The ESO sits at the heart of a complex, multi-directional system of electricity flows. Coal and first-generation nuclear power are being replaced by small-scale renewables, storage and demand-side participation. This makes operating the system more challenging than ever before. We are rising to this challenge and have a clear vision for how we and the industry must change, including developing new capabilities and culture within our business. Supported by a new, bespoke regulatory model, we will facilitate the transition to a zero-carbon power system, helping to achieve the UK's recent commitment to net zero emissions by 2050. Alongside this, we will continue to deliver energy safely and reliably and provide value for consumers in everything we do. Our Business Plan identifies the necessary actions and investments to achieve this goal.

The broad consensus of stakeholders is that the ESO needs to have a stretching ambition that will facilitate the transition to a net zero economy by 2050 and that investment will be needed in RIIO-2 to achieve this.

Our System Operator (SO) mission[1] is to enable the transformation to a sustainable energy system and ensure the delivery of reliable, affordable energy for all consumers.

Success in 2025 includes:

- an electricity system that can operate carbon free
- a strategy for clean heat and progress against that plan
- competition everywhere
- the System Operator is a trusted partner.

The development of this Business Plan for RIIO-2 is an unprecedented and exciting opportunity for the ESO to engage extensively with stakeholders to define and develop our role during a time of significant change. This October draft plan is the second draft RIIO-2 plan we have published, and we welcome further stakeholder feedback before we submit our final plan in December 2019.

We provide an overview, at the start, of the feedback we heard from stakeholders and how this has shaped our Business Plan. We also set out, in each chapter of the plan, the specific stakeholder feedback that has influenced our detailed proposals. The broad consensus of stakeholders is that the ESO needs to have a stretching ambition that will facilitate the transition to a net zero economy by 2050 and that investment will be needed in RIIO-2 to achieve this. Accompanying this document is a RIIO-2 Stakeholder Report, where you can find all the feedback we received and how we have responded to it.

[1] Our mission applies to both our Electricity System Operator and our Gas System Operator businesses.

1.2 Consumer benefits of £2 billion

£3

The net reduction in annual consumer bills that we will deliver in RIIO-2.

Our Business Plan includes ambitious new outputs to facilitate the transition to a zero carbon energy system. We estimate that these proposed new activities will generate net benefits of around £2 billion for consumers over the five-year RIIO-2 period[2]. Our actions mean that industry costs are lower than would otherwise be the case through lower balancing costs, avoided network investment, and industry efficiencies. This generates savings that will be passed to consumers through lower bills. **In RIIO-2 the ESO will deliver a net annual saving to consumers of around £3 per bill.**[3]

Some of the major components of these benefits are:

- Investment in our control centre architecture and systems, so we can operate a zero carbon system by 2025. Direct benefits come from reduced emissions and lower consumer bills through reduced balancing costs – delivering consumers **net benefits of £242 million.**
- Working more closely across transmission and distribution networks to take a whole-system view of zero carbon operability. This will reduce consumer bills through avoided network costs and constraint cost savings – delivering consumers **net benefits of £469 million.**
- Transforming network planning by introducing competition between network and commercial solutions. This will promote innovation in 'non-build' solutions and reduce bills through avoided asset investment and lower constraint costs – delivering consumers **net benefits of £663 million.**

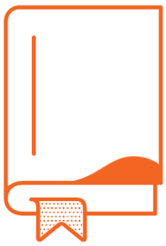
Types of benefit we deliver

The financial benefit figure we have estimated for consumers is likely to significantly understate the total benefits that the ESO will drive. This is because it only includes the benefits that are able to be quantified, and does not consider wider environmental improvements or the wider benefits of our core role – providing a safe and reliable supply of electricity to underpin an economy worth **£2 trillion.**

[2]Net benefits in the document refers the Net Present Value (NPV) of an activity or group of activities. See the separate cost-benefit analysis report of more details on how we have calculated NPV

[3]This is a net saving that includes the £1.65 ESO annual cost per consumer bill in the first two years of RIIO-2 (2018-19 prices). This saving is as a result of our new and transformational proposals only. The ESO's core ongoing role also delivers consumer savings that have not been quantified, so the £3 is likely to be an underestimate.

Key Outputs in RIIO-2



In RIIO-2 we will deliver:

- new control centre architecture and systems to operate a zero-carbon network by 2025
- new area monitoring and control systems, to ensure power system stability in a low carbon world
- new market and auction platforms to promote competition and enable participants as small as 1MW to participate
- an open data portal to provide a single point of contact for all ESO data and services, enabling a step change in data use and sharing across the industry.

We will also continue to:

- operate the electricity system so there is a minute-by-minute balance of supply and demand of electricity
- manage balancing and constraints to minimise costs to consumers
- manage existing balancing service markets, developing future markets and making improvements to facilitate greater transparency, participation and competition
- manage industry revenue flows through playing a leading role in setting charging methodologies
- collect charges for use of the transmission network and balancing services
- continue our electricity market reform (EMR) delivery body role
- manage connection applications for the transmission network, and continue acting as the contractual counter-party for these connections
- plan for the future of the electricity system, including network planning and the *Network Options Assessment (NOA)* process, as well as how this interacts with the whole energy system.
- publish a variety of insights and data, including our annual *Future Energy Scenarios*
- deliver IT system changes required by our customers, and those mandated by GB and EU regulations.

Consumer bills £3 lower

£2 billion net present value of consumer benefits to be delivered in RIIO-2.

1.3 RIIO-2 is a crucial period to invest in the low carbon energy system of the future

The proposals in our plan have been designed as a coherent suite.

Each individual proposal plays a critical part in supporting the future energy landscape and delivering for stakeholders, customers. and consumers.

We propose a set of outputs, across four themes, that are innovative and ambitious, yet crucial, if we are to achieve our goal of net zero emissions by 2050. This is in line with stakeholders' ambition for us, and the imperative to rapidly decarbonise the energy system.

Theme 1: Reliable, secure system operation to deliver electricity when consumers need it

As we move to a low-carbon energy system, our operating environment continues to change dramatically. We will innovate, invest and adapt to maintain reliable and secure system operation, and realise the benefits for consumers of a decarbonised energy system.

Our proposals focus around three areas of transformational activity:

- expand and transform our Control Centre architecture and systems, so we can operate a zero carbon electricity system by 2025
- training and simulation, to build our capability to operate the system under a range of future decarbonised scenarios, in partnership with the wider energy industry
- innovative ways to restore the system, so we can ensure the future decentralised electricity system is resilient and reliable, at an appropriate cost.

Theme 2: Transforming participation in smart and sustainable markets

Smart and sustainable new markets will be essential for operating a carbon free electricity system. We will need to attract higher volumes of flexibility, such as demand-side response and storage. Our balancing products, markets, processes and IT infrastructure need to be transformed to effectively facilitate decarbonisation and the consumer benefits that follow.

Our proposals focus on three broad areas of new activity:

- build the future balancing service and wholesale markets to attract the volume of flexibility we will need in the future, to achieve the UK's commitment to net zero emissions by 2050
- transform access to the capacity market to deliver security of supply with a plant mix that supports the UK's 2050 carbon target at an appropriate cost to consumers
- develop code and charging arrangements that will facilitate the rapid change required to achieve the low carbon energy system of the future.

Theme 3: Unlocking consumer value through competition

One of the success criteria for our SO mission is 'competition everywhere'. Theme 2, above, focuses on smart and sustainable markets. Under theme 3 we propose ways to facilitate greater competition in solutions to network problems, so we can unlock significant consumer value.

During RIIO-2 we propose to:

- deliver new competitive processes, so asset and non-asset based solutions can compete to meet future system needs

- extend and enhance the *Network Options Assessment* (*NOA*) approach, bringing the significant cost savings the *NOA* has already achieved for consumers to other areas, such as end of life asset replacement decisions
- undertake, with industry, a review of the System Quality and Security of Supply standard (SQSS) so system standards are appropriate for the decarbonised energy system of the future
- support Ofgem to develop its thinking on competitively appointed transmission owners, bringing the benefits of competition to a wider range of consumers.

Theme 4: Driving towards a sustainable whole energy future

We need to take a whole system view of the changing energy landscape so we can optimise total costs and facilitate the transition to a low-carbon energy system in a way that maximises benefits to consumers. Our proposals focus on:

- leading the debate on decarbonisation of the GB energy industry, harnessing our significant expertise to identify ways to achieve the 2050 net zero target, and policy decisions that must be made
- working more closely with Distribution Network Operators (DNOs) and Transmission Owners (TOs) to streamline the connection process, so that parties can take a more efficient, whole electricity system view
- defining innovative ways to achieve zero-carbon, whole electricity system operability, working with DNOs
- developing a whole electricity system approach to accessing networks, therefore tackling an area of significant consumer cost.

A coherent set of proposals

These outputs combine to present a coherent whole that meets the needs of our stakeholders, customers and consumers.

- By expanding and transforming our Control Centre architecture and systems, we enable smaller players to participate at scale in our balancing services. This will promote competition and efficient costs.
- The information and insight the systems provide will enable us to better understand our requirements for a range of balancing services. This will support efficient procurement to help manage the system's operability.
- As well as developing IT systems and processes to transform access to the capacity market, the same systems will support our balancing services procurement. This will make it easy for parties to engage with our balancing services and to participate in our procurement events.
- The improved capabilities that result from these activities will facilitate effective competition to meet transmission system needs. This will provide further evidence to support our *NOA* recommendations, delivering greater value for consumers.

We will collaborate widely so we can make sure the IT systems, market designs and processes we deliver to enable the outputs described above take a whole system view. This will ensure compatibility and efficiency across transmission and distribution networks for the benefit of consumers, market participants and networks.

Delivering our plan

In response to stakeholder feedback, we have put together an ambitious set of proposals. We recognise the challenges for delivery and have incorporated strong programme management and specific risk mitigations into our plan. Our strategies for people, culture and capability as well as IT delivery will increase the capability of the ESO to deliver this ambitious plan. Our cost-benefit analysis has shown that for our proposed new outputs, the benefits significantly outweigh the costs of implementation. We will continue to monitor and manage the risks to delivery, bearing in mind the significant value that our actions can provide in RIIO-2.

1.4 The ESO is crucial to the transition to a low carbon energy future

The future is already here

The “three Ds” of the energy transition – decentralisation, decarbonisation and digitisation – are well known. We are now operating in this future. The “new normal” is an energy system where:

- **renewable and low-carbon technology** dominates how we generate electricity, the way we travel and how we heat our homes
- This technology will be more **decentralised** with significant distributed and local generation, supported by energy storage and demand-side solutions
- consumers **produce, store and sell energy** in response to market signals, based on cost and carbon-intensity, through peer-to-peer trading, smart homes, and participation in our balancing and ancillary service markets
- **advanced data and analytics** change the way market participants interact with us and each other, and enable them to make informed choices.

The ESO of 2025 will therefore be an organisation that operates the electricity system using new technologies. These will harness the power of **automation, artificial intelligence and machine learning** to efficiently manage tomorrow’s complex energy system. We will **lead changes to markets** so new sources of flexibility, including innovative providers and disruptive technologies, can participate in the low carbon energy mix of the future. We will pave the way for **sharing data** across the industry, which will help improve decision-making and increase transparency. It will be essential for us to work across **transmission and distribution boundaries**, collaborating with network and market companies to solve local and national constraint and balancing challenges together.

To achieve this, we need to invest in new systems and market platforms that will lay the foundation for the decarbonisation of Britain’s energy system and help to achieve the government’s recent commitment to net zero emissions by 2050. Importantly, we must also change as a business. Our capabilities and culture must evolve as we become an organisation at the cutting-edge of technology, trusted by the industry and consumers to drive the energy transition.

Innovation

40
The number of innovation projects undertaken by the ESO since 2013, working with partners across industry and academia.

innovation is at the core of our operating model. It is a key enabler for delivering our Business Plan, driving efficiency, and helping us to lead the transition to a low carbon energy system. The innovation projects we have delivered in RIIO-1 are lowering industry costs, and therefore consumer bills. We will continue our strong focus on innovation in RIIO-2 with an expanded core capability and bespoke funding stream with a clear link to the delivery of consumer benefits. We develop our innovation priorities based on major energy system trends, our SO mission, and specific challenges identified by the business. We test these priorities with stakeholders each year, a process which also helps to identify new collaboration opportunities. Our current priorities include tackling issues such as electricity system stability, whole electricity system issues, future markets and the digital transformation.

1.5 Our proposed investment is efficient and provides value for money

Investment in the ESO in RIIO-2

£1.65
the cost of the ESO in RIIO-2 on a consumer's annual energy bill.

In RIIO-2 the ESO has a two year business planning cycle and our spending will be approved on a two-year basis. The ESO's proposed spending is £244 million in 2021-22 and £257 million in 2022-23 – an average of £250 million per year. This includes £60 million of proposed new investment as well as continued delivery, and enhancements to, the processes and systems we use to carry out our core role. The increase on our RIIO-1 annual average spending of £180 million per year is mainly due to this £60 million new proposed investment. Other spending increases have been offset by efficiency gains, so the remaining net increase represents increased spending on our core IT services, including additional investment in digital and cyber security measures.

Due to the longer-term nature of our investments, we also provide a five-year view of costs in this document. These will be updated in our next Business Plan in 2023.

Annual costs and net benefits

£2 billion
Net benefits for consumers over RIIO-2.

Efficiency

We are committed to making sure we run our business at an efficient cost to consumers. In RIIO-2 we will represent £1.65 on an annual consumer bill[4]. This equates to around 0.3% of the total electricity bill and less than <0.2% of the dual fuel bill. For this we will deliver benefits of around £4.80 – a net reduction of more than £3 on each consumer bill.

We conducted an international benchmarking exercise to examine our overall proposed £250 million average annual investment. We also subjected all components of our proposed costs to further efficiency challenge involving cross sector benchmarking. Where our initial proposed costs were higher than benchmarks, we reviewed our delivery plans and challenged our costs so that they fell within benchmarked ranges. All of our proposed spending on new outputs has been subject to cost-benefit analysis to ensure we are focusing on the solutions that provide the most benefit for consumers. As a result of our benchmarking, we are confident that we will begin RIIO-2 with a set of costs at the efficiency frontier.

£7 million
Embedded annual efficiency savings.

Our proposed annual investment consists of:

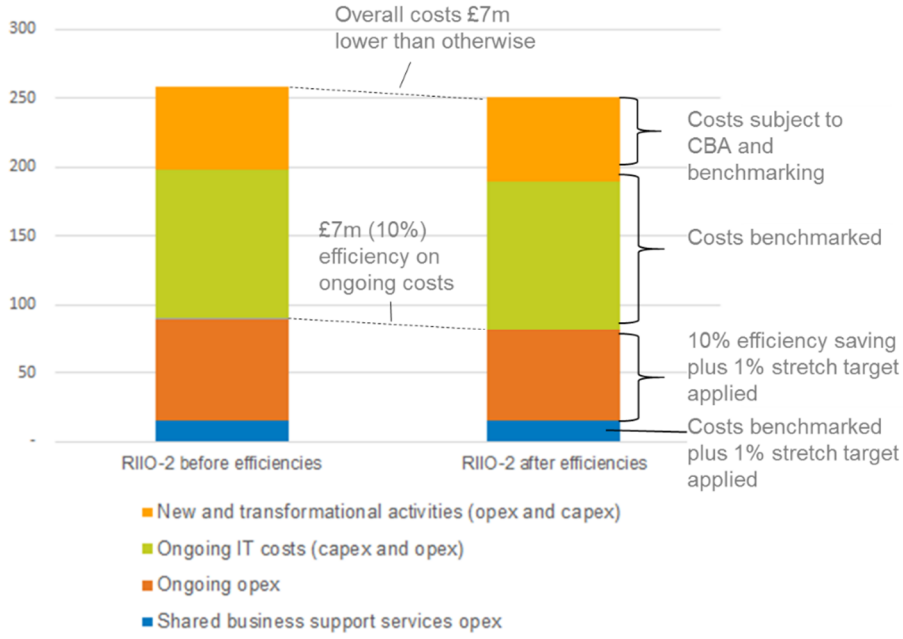
- **£69 million direct operating costs, incorporating £7m annual efficiency savings** for the ongoing services we have delivered in RIIO-1 and will continue to deliver in RIIO-2. These reflect the efficiency gains from process improvements, automation and offshoring that we invested in over RIIO-1. Where activity costs have gone up, we have described the external factors that have led to this increase. In RIIO-2 we're committing to a further **1% efficiency stretch target** on these costs, based on international, cross-sector productivity trends, so we stay at the efficiency frontier.
- **£18 million shared service costs** have been benchmarked for efficiency using cross-sectoral data. This benchmarking showed that our forecast costs for RIIO-2 are equivalent to the most efficient companies, after adjusting for costs of being a regulated network and the additional security measures we take to protect our operations from threat. In RIIO-2 we're committing to a further **1% efficiency stretch target** on these costs, based on international, cross-sector productivity trends, so we stay at the efficiency frontier.
- **£103 million ongoing IT costs** to run and grow our core services have been benchmarked for efficiency using cross-sectoral data. These were subject to a detailed, cross-sector benchmarking study by Gartner. We conducted a further review of these costs with our application development and maintenance partners. As a result, we can demonstrate that our proposed IT costs are efficient.
- **£60 million investment in new and transformational outputs** has been subject to cost-benefit analysis to assess the consumer benefit case for this investment, and which options should be taken forward. Furthermore, all proposed new capital expenditure has been **benchmarked** for efficiency by Gartner and our application development partners, as above.

All components of our proposed spending are benchmarked for efficiency and/or subject to cost-benefit analysis, or subject to an efficiency stretch target.

[4] This is the annual cost in the first two years of RIIO-2, 2018-19 prices

Annual spending before and after efficiencies, £ million

All components of our proposed spending have therefore been benchmarked for efficiency and/or subject to cost-benefit analysis, or subject to an efficiency stretch target.



1.6 A funding model to underpin an ambitious, financeable plan

The introduction of a new regulatory framework for the ESO in RIIO-2 is an opportunity to put in place a funding model and incentive scheme that supports the ESO to deliver the ambitious outputs that stakeholders want from us.

The ESO is a different business from the network companies regulated under RIIO. We are an asset-light business that provides a range of services to the industry. These services are not necessarily correlated to our Regulatory Asset Value (RAV) and result in cash flow and revenue volatility at a scale many times greater than the ESO's size. For example, we transact £4 billion of cash every year, which is 20 times larger than our controllable revenues. The calibration of our funding model needs to reflect these unique characteristics and incentivise the ESO to deliver first and foremost for consumers. It also needs to make sure we can continue to finance our business.

In parallel with developing our RIIO-2 Business Plan, we are working with Ofgem as it designs this new framework, a process that is still ongoing.

At the end of August this year, Ofgem confirmed elements of the ESO's funding model and launched a consultation on methodologies and working assumptions for our financial parameters. Our assessment of these working assumptions is that they risk the ESO being unable to raise sufficient investment to deliver our Business Plan. An important aspect of our financeability is the provision of adequate remuneration to reflect the services we provide and the risk we hold, for example in our industry revenue management role. Our Business Plan will continue to develop as Ofgem provides more clarity on our financial framework later in the Autumn.

It is essential that our funding model and incentives work as a coherent, holistic package so the ESO is financeable, incentivised to innovate and invest on behalf of consumers, and can earn a fair return for the services we provide and the risks we hold.

A flexible model to respond to uncertainty

As the energy landscape is constantly evolving, we need a robust process to continue to manage changes and update our activities as appropriate. Our regulatory framework is designed to enable this in two ways:

- Our Business Plan focuses on our activities for the first two years of RIIO-2, in the context of our 5-year strategy. In subsequent two-year cycles, we will review the energy landscape as we update our proposed spending and activities.
- Pass-through funding for our costs gives us flexibility to adjust our spending within two-year Business Plan cycles in response to changes to the energy landscape and/or stakeholder needs.

We therefore do not need separate formal uncertainty mechanisms as part of our regulatory framework.

1.7 The ESO will transform in RIIO-2

Our capabilities and culture must evolve as we become an organisation at the cutting-edge of technology.

We recognise that delivering the ambitious outputs that stakeholders want will require significant change within the ESO. Our capabilities and culture must evolve as we become an organisation at the cutting-edge of technology, trusted by the industry, consumers and citizens to facilitate the energy transition.

We will:

- build on our existing, technical understanding of power engineering to enhance our capabilities in **advanced analytics and data management**
- increase **IT delivery capability** so we can progress projects in an agile, iterative and fail-fast manner, realising value for consumers as soon as possible from the energy transition
- invest in the **innovation** capability at the core of our operating model, making sure we are maximising the potential of technological change to deliver our Business Plan commitments and decarbonise the energy system
- develop a workforce that operates in a **culture of leading by empowering**, with a collaborative mindset striving to achieve a shared ambition of net zero by 2050. ESO colleagues will respond to business and customer needs in an agile manner, within a supportive environment that encourages innovation and balanced risk-taking.

Our ESO culture will continue to be supported by strong core leadership values to drive collaboration, create the future, take bold and brave actions, tell compelling stories that inspire belief, and lead with influence and presence.

1.8 Investing to create an ESO for our shared, low carbon future

We are excited by the opportunity that RIIO-2 presents for us to step up and be the ambitious, consumer-focused ESO that our stakeholders want us to be. Our proposed new activities will facilitate the transition to net zero emissions by 2050 and provide net benefits of £2 billion over the RIIO-2 period. This translates to a saving of around £3 on every consumer's annual bill. The challenge is unprecedented, but the time to act is now. We look forward to working with stakeholders and Ofgem to finalise our plan and the funding model that will underpin it. This should incentivise us to continually innovate and deliver benefits for consumers as we transition to the zero carbon energy system of the future.

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